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**FINAL SITE INSPECTION REPORT
FOR
BRISTOL COMPANY
WATERBURY, CONNECTICUT**

CERCLIS No. CTD981898406

TDD No. 9105-83-AWS

Work Assignment No. 09-1JZZ

Prepared by:

Roy F. Weston, Inc.
525 Brook Street
Rocky Hill, Connecticut 06067

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WESTON/ARCS

Reviewed and Approved:

[Signature] 9-17-93
Task Manager Date

George G. Quinsey for Evelyn Borch 9-17-93
Site Manager Date

[Signature] 9/17/93
QA Review Date

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**Final Site Inspection Report
Bristol Company
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INTRODUCTION

The Roy F. Weston, Inc. Alternative Remedial Contract Strategy (WESTON/ARCS) team was requested by the Region I U.S. Environmental Protection Agency (EPA) Waste Management Division to perform a Site Inspection of the Bristol Company property in Waterbury, Connecticut. All tasks were conducted in accordance with the ARCS contract, and the Site Inspection scope of work and technical specifications provided by the EPA under Work Assignment No. 09-1JZZ which was issued to WESTON/ARCS on March 26, 1991. The NUS Corporation prepared a Preliminary Assessment of this property and the Bristol Babcock Company on March 20, 1987 which recommended a medium priority Site Inspection based on the alleged presence of a sludge lagoon on the property and the proximity of the site to the Naugatuck River. The Bristol Company Site Inspection was initiated based on the information provided in the Preliminary Assessment.

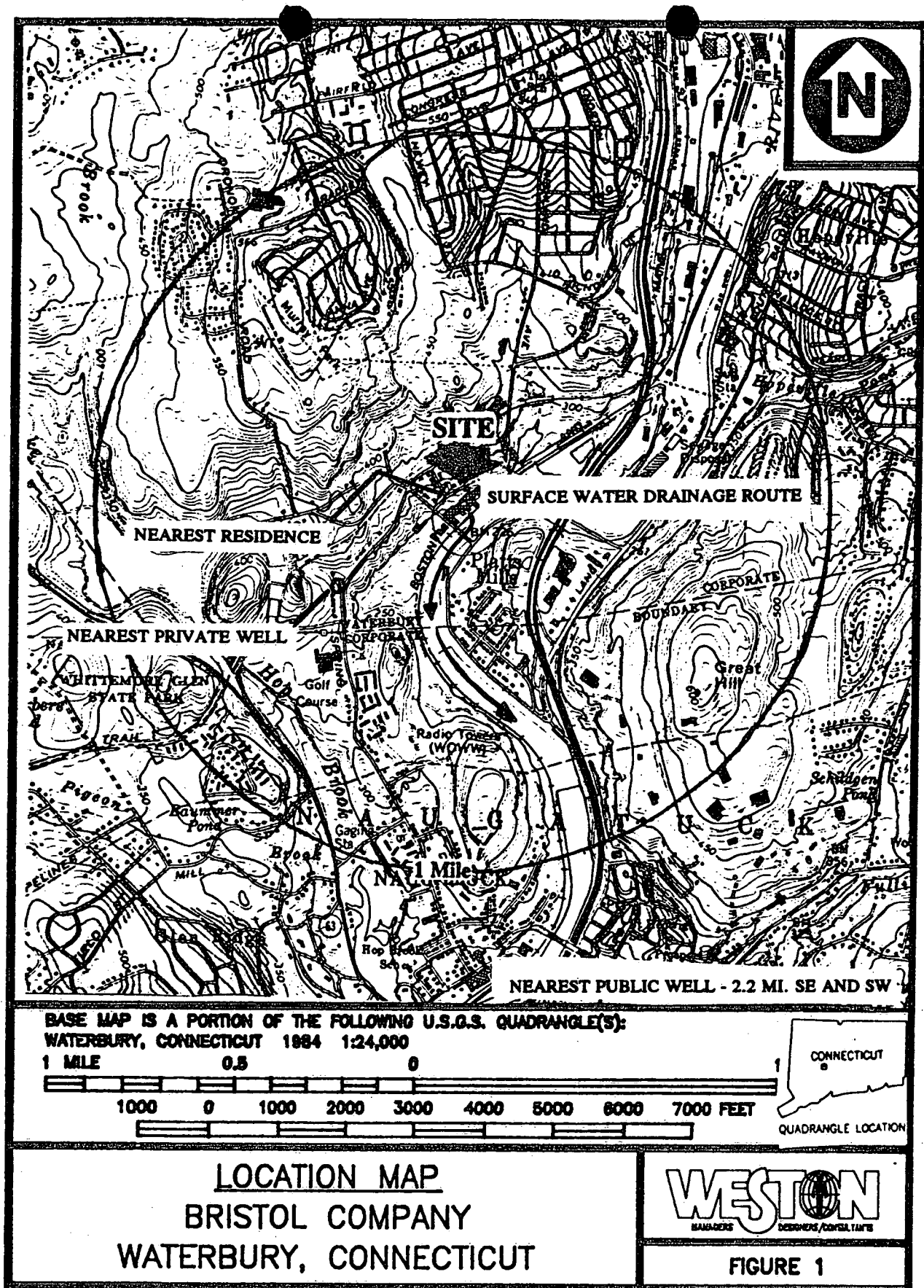
Background information used in the generation of this report was obtained through file searches conducted at the Connecticut Department of Environmental Protection (CT DEP) and the Region I EPA, telephone interviews with town officials and individuals knowledgeable of the site history and characteristics, and conversations with other Federal, State and local agencies. Information was also collected during the WESTON/ARCS on-site reconnaissance conducted on September 4, 1992, and the WESTON/ARCS sampling event conducted on December 18, 1992.

This package follows guidelines developed under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended, commonly referred to as Superfund. However, these documents do not necessarily fulfill the requirements of other EPA regulations such as those under the Resource Conservation and Recovery Act (RCRA) or other Federal, State or local regulations. Site Inspections are intended to provide a preliminary screening of sites to facilitate EPA's assignment of site priorities. They are limited efforts and are not intended to supersede more detailed investigations.

SITE DESCRIPTION

The Bristol Company (Bristol) is located at 40 Bristol Street in Waterbury, New Haven County, Connecticut (latitude 41° 31' 30" North, longitude 73° 03' 10" West) (Figure 1) [1]. Bristol operated on the property from approximately 1897 until 1961. Bristol produced a line of instrumentation including temperature controls, chemical sensors, recorders and indicating devices for industrial use. Babcock Wilcox, Ltd., the Bristol Babcock Company and the American Chain and Cable Company manufactured similar products on-site between 1961 and September 1988. The property has been vacant since September 1988 [2,3].

The approximately 17 acre Bristol property is located in a residential and commercial zoned area of Waterbury [4]. According to the City of Waterbury Tax Assessor's records, the property is



located on Map 545, Block 1177 and Lot 6 [5]. The property is immediately bordered to the west and north by narrow wooded areas approximately 100 feet wide, to the east by the Boston and Maine Railroad and the Naugatuck River and to the south by a wooded area (Figure 2). Land uses in the site vicinity include single family residential to the west, single and multi-family residential to the north, residential, commercial and industrial to the east across the Naugatuck River and residential and vacant land to the south [2].

The nearest residences are located approximately 200 feet west of the former manufacturing areas on the northern half of the Bristol property. The Bristol site and the area around the site are served by public water and sewer services [6]. The closest public supply well is located approximately 2.2 miles southwest of the property while the closest private well is located approximately one-third of a mile southwest of the property [6,7]. An out of service production well is located on the southeastern corner of the Bristol property. Bristol reportedly used this well as a supplementary process water supply [2]. Well use dates could not be determined from the site contact or file information.

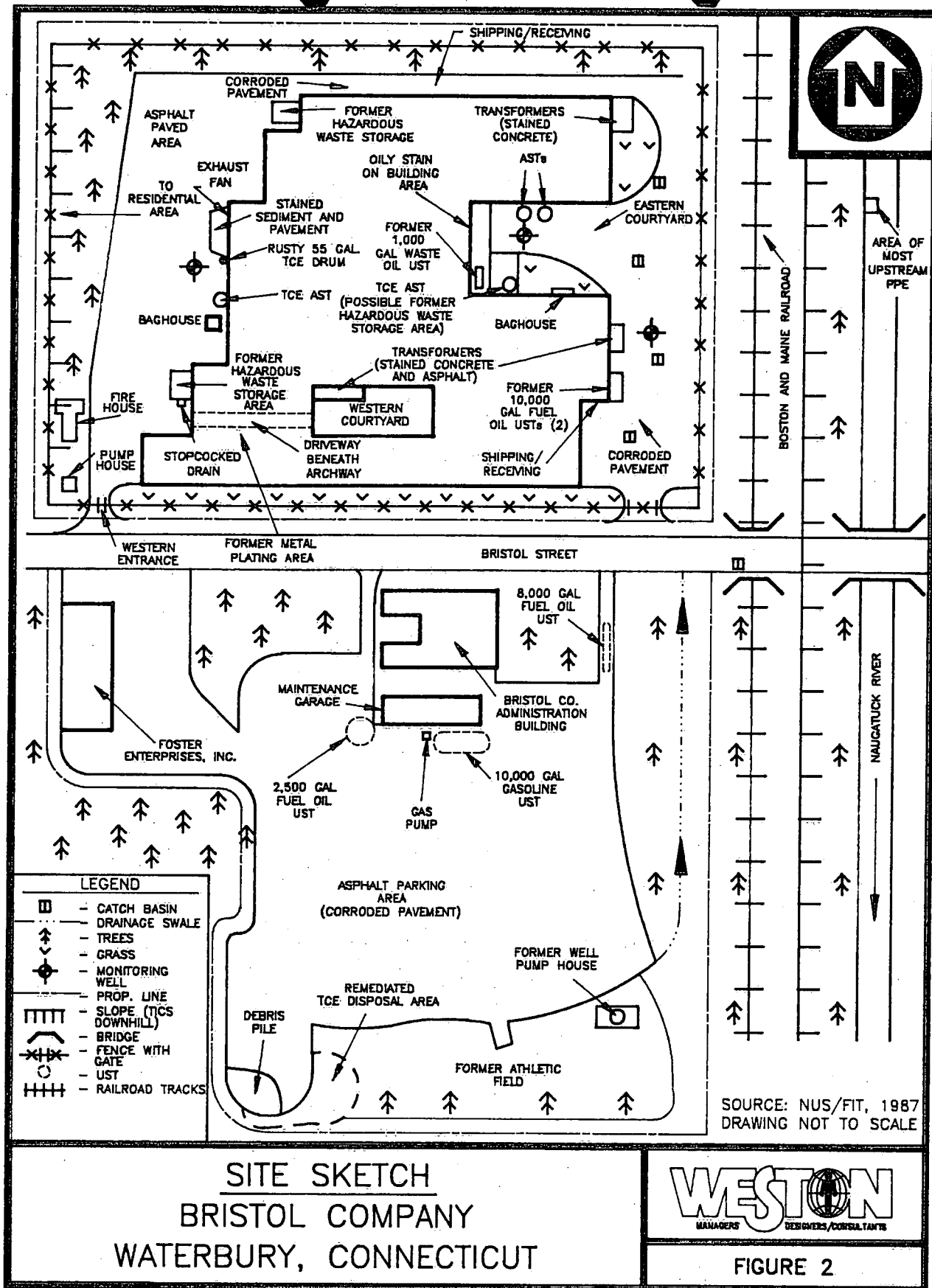
The Bristol property is centrally divided by Bristol Street. Bristol's manufacturing buildings are located on the northern half of the property while the administrative and maintenance buildings and employee parking area are located on the southern half (Figure 2). Pedestrian access to the northern half of the property is restricted by a six foot chain link fence. Access to the two vehicular entrances to the manufacturing portion of the property is restricted by locking gates. Vehicular and pedestrian access to the southern half of the property is unrestricted [2].

The entire property slopes gently toward the east. Drainage on the northern half of the property is directed into a series of catch basins which reportedly discharge into the Naugatuck River, approximately 50 feet east of the property's eastern border. Drainage on the southern half of the property flows into a swale which parallels the property's eastern border. The swale directs drainage northward along the property border to Bristol Street where drainage is directed into catch basins [2].

A majority of the Bristol property is paved or occupied by buildings. Grassed and landscaped areas are limited to the Bristol Street entrances of the administrative and manufacturing buildings and a courtyard on the eastern side of the manufacturing complex. An employee athletic field and a wooded area occupy the southern end of the property. Large areas of cracked and broken pavement were noted by WESTON/ARCS around the northern and eastern sides of the manufacturing buildings and in the employee parking lot [2].

Fifteen interconnected Bristol manufacturing buildings are located on the northern half of the property. Buildings are constructed of brick and steel with concrete slab floors. The buildings range from one to six stories in height. The oldest building, constructed around 1897, is located along Bristol Street while the newest, constructed around 1966, is the northernmost. Two small brick structures, formerly housing a pump house and fire house, are located on the western portion of the property near the western entrance to the manufacturing areas [2].

Primary shipping and receiving areas are located on the north side of the northernmost building and along the east side of the complex [2]. Two outdoor, unsheltered former hazardous waste storage areas were observed on the west side of the manufacturing complex during the



WESTON/ARCS on-site reconnaissance (OSR). Both areas were covered with bituminous asphalt in good condition without asphalt staining or corrosion. Both areas covered approximately 275 square feet and were enclosed by three inch asphalt berms, which also appeared to be in good condition. WESTON/ARCS observed a stopcocked drain on the south side of the westernmost former storage area. No asphalt staining leading from the drain on the southern former storage area was noted [2]. A third former unbermed storage area is located on a partially sheltered concrete pad at the southwest corner of the courtyard on the east side of the manufacturing complex. WESTON/ARCS did not observe any concrete staining in this area during the OSR [2]. No residual waste was noted in any of the former storage areas.

WESTON/ARCS observed four apparently empty steel above ground storage tanks on the manufacturing portion of the property. One of the tanks is located against the west central wall of the manufacturing complex. Three tanks are located against the manufacturing complex walls in the courtyard on the eastern side of the complex. The tanks are located on concrete and/or asphalt and WESTON/ARCS did not observe any staining beneath or around the tanks. WESTON estimates the capacities of each of these tanks to be approximately 500 gallons. Bristol reportedly used these tanks for storage of solvents such as trichloroethene (TCE). The tanks are estimated to be approximately 30 years old, based on visual observations of rusting [2].

WESTON/ARCS observed an area of oily staining on the manufacturing complex eastern wall in the courtyard. According to the site contact, Mr. Mike Palumba, a 1,000 gallon waste oil underground storage tank (UST) was removed from this area in 1989. WESTON/ARCS noted an area of soil in the vicinity of the former tank location, covering approximately 30 square feet, which appeared to have been removed and replaced with sand fill [2].

WESTON/ARCS noted an area of disturbed soil, covering approximately 1,000 square feet, on the east central side of the complex. According to Mr. Palumba, two steel 10,000 gallon No. 4 heating oil USTs were removed from this area in 1989. Mr. Palumba stated that the tanks were contained in a masonry vault with a concrete floor and roof [2].

One gasoline pump and associated steel 10,000 gallon UST fill pipe were noted on the south side of the maintenance garage. Mr. Palumba indicated that the pump was used to fuel Bristol maintenance vehicles. According to Mr. Palumba, a steel 8,000 gallon No. 4 fuel oil UST is located on the east side of the administrative building and a steel 2,500 gallon fuel oil UST is located near the southwest corner of the maintenance building. [2]. All fuel oil and gasoline tanks on the property were reportedly installed during the 1950s [8].

WESTON/ARCS observed two transformer pads on the east side of the manufacturing complex and one pad within an asphalt courtyard on the south side of the complex. In each of the three areas, three unlabelled transformers were observed situated on unbermed concrete pads, enclosed by a eight foot chain linked and barbed wire fence. Vandalization of all the transformers had caused extensive transformer oil leakage onto surrounding concrete and asphalt. An estimated total area of 1,000 square feet of surface staining was noted around these transformers [2].

One dust collection baghouse was observed by WESTON/ARCS on the west side of the manufacturing complex and another in the eastern courtyard. The site contact indicated that these units were used for dust collection from metal working operations. The doors of both dust

collection units were open, revealing approximately 75 cubic feet of accumulated metal fragments and dust in each unit. WESTON/ARCS did not observe any asphalt staining around the western unit nor any soil staining around the courtyard unit [2].

WESTON/ARCS observed a large exhaust fan in the west wall of the manufacturing complex. An approximately 500 square foot area of asphalt and sediment beneath and around this fan had an oily black staining. Metal springs were also observed in the stained sediment. A rusty 55 gallon drum, labelled as trichloroethene, was noted by WESTON/ARCS approximately 15 feet south of the stained area. The drum appeared to be empty [2].

Three flush mounted groundwater monitoring wells were observed on the manufacturing portion of the property by WESTON/ARCS: one well is located on the west side of the complex, one in an area of corroded asphalt in the eastern courtyard and one in the eastern driveway, approximately 15 feet east of the transformer pad [2].

At the south end of the property, south of the employee parking lot, WESTON/ARCS observed an area of disturbed soil, covering approximately 10,000 square feet, which appeared to have been excavated. Mr. Palumba reported that this area had been used for illegal waste trichloroethene (TCE) disposal by an individual or company not associated with Bristol during the mid-1980s and that the area had been remediated under CT DEP guidance between 1987 and 1990 [2]. Mr. Palumba did not know who was responsible for the unauthorized disposal.

WESTON also observed several piles of household and yard waste totalling approximately 50 cubic yards, approximately 50 feet north of the soil remediation area at the south end of the employee parking lot. Mr. Palumba reported that local residents use this area for refuse disposal [2].

A one story concrete and cinderblock building, located at 57 Bristol Street, was noted on the western border of the Bristol property, west of the Bristol administrative building. The building is occupied by Foster Enterprises, Inc., which is involved in the assembly of generator parts. According to Mr. Palumba, Foster leases the building and no manufacturing is conducted on the premises [2].

OPERATIONAL AND REGULATORY HISTORY AND WASTE CHARACTERISTICS

Manufacturing operations have occurred on the subject property since approximately 1897 when the first manufacturing buildings were constructed [2]. Additional manufacturing buildings were constructed during the 1920s until approximately 1960 [8]. Of the 15 interconnected on-site manufacturing buildings currently present, the northernmost building is reportedly the most recent [2]. The administration building was reportedly constructed during the 1920s and the maintenance garage during the 1940s [8].

Property use prior to 1897 could not be determined. Bristol operated on the property from approximately 1897 until 1961. Between 1961 and 1978, the American Chain and Cable Company operated on-site. Between 1978 and 1981, the facility operated as Babcock Wilcox, Ltd. and between 1981 and the facility closing in September 1988, it operated as the Bristol

Babcock Company (Bristol Babcock) [9]. The Bristol Babcock Helicoid Instrument Division was reportedly absorbed into Bristol Babcock in 1986 [10]. All operations reportedly involved the same types of manufacturing processes and chemicals [9].

The Bristol property has been owned by Norman S. Drubner since December 23, 1986. At that time, the property was sold by Bristol Babcock to Mr. Drubner with a Form III filing to the CT DEP [11]. Bristol Babcock ceased its manufacturing operations in September 1988 and moved to Watertown, CT [8,12].

No information concerning the Bristol Company was located during the State file search. Most State file information identified pertained to Bristol Babcock. However, both operations likely involved similar manufacturing processes, the use of similar chemicals and the generation of similar wastes.

Bristol manufactured pneumatic, electrical and mechanical controlling systems. On-site operations included drilling, milling, stamping and grinding of metal bar stock, vapor degreasing, nickel, cadmium and copper electroplating, epoxy and enamel painting, soldering and welding [3,12]. Steel, brass and aluminum bar stock and a variety of chemicals including acids, metal plating solutions, cutting and lubricating oils, paints and organic compounds such as TCE, 1-1-1-trichloroethane (TCA), chloroform, methyl chloride and toluene were used in the manufacturing process [12]. A metal plating shop was located at the southwest side of the building.

Virgin solvents were stored in the outdoor above ground tanks described in the previous section, in 55 gallon drums inside manufacturing portions of the complex; the two outdoor hazardous waste storage areas on the west side of the manufacturing complex; and possibly the outdoor storage area in the eastern courtyard. Virgin acids were also reportedly stored in the outdoor hazardous waste storage areas as well as inside the manufacturing buildings [8].

Bristol Babcock generated a variety of wastes from manufacturing, including spent solvents, acids, cyanide, oils, paint thinner and paint and metal hydroxide sludge. Bristol Babcock was listed as a RCRA large quantity hazardous waste generator (EPA ID No CTD001456979). Solvents for degreasing were reportedly reused until they developed a sludge consistency. Bristol Babcock reportedly used a licensed RCRA waste transporter for off-site disposal of the resulting sludge approximately every two to three months. As stated in the PA, in 1987 Bristol Babcock generated approximately 2,000 gallons of nickel sludge and 1,200 gallons of copper and chromium sludge annually [12].

A 1983 Biennial Hazardous Waste Generator Report for Bristol Babcock indicated that 88 gallons of waste TCE (FOO1) were hauled to Hampden Color and Chemical in Springfield, MA for disposal and the following wastes were hauled to Recycling Industries in Quincy, MA: 385 gallons of waste paint (D001); 1,540 gallons of wastewater treatment system sludge (F006); 595 gallons of waste cyanide (D003) and 1,760 gallons of waste acid (F006) [3]. In addition, approximately 150 gallons of waste oil were generated per month and stored in the on-site waste oil tank. Waste oil was hauled off-site by the Connecticut Waste Oil Company [13].

Waste solvents, acids and empty 55 gallon drums were stored in the two outdoor bermed storage

areas on the west side of the manufacturing building and possibly in the storage area in the eastern courtyard. Empty 55 gallon drums were also stored on a driveway beneath an archway entrance to the western courtyard [8]. Waste management practices prior to the 1980s could not be determined from available file information or the site contact.

Metal hydroxide sludge was also generated from on-site wastewater treatment system used for metal finishing wastewater. Bristol Babcock discharged an average total of 14,440 gallons per day (gpd) of treated wastewater to the Naugatuck River under a National Pollutant Discharge Elimination System (NPDES) Permit Number CT 0000035 [12,14,15]. The wastewater treatment system was installed in 1971 [16]. Between 1971 and 1988, an estimated 200 to 800 gallons of metal hydroxide sludge were generated annually from the wastewater treatment system and hauled off-site for disposal approximately every 75 to 80 days [8].

Bristol Babcock received Compliance Order No. 2499 from the CT DEP on May 23, 1979 for in adequate treatment of metal finishing wastewater and cooling water [17]. The treatment system was apparently modified between 1979 and 1981 to address this order. However, no documentation could be found in the CT DEP files.

According to an October 30, 1981 wastewater treatment plant inspection report by the CT DEP, the treatment system was used for nickel, cyanide, chrome and copper treatment as well as acid and alkaline wastewater neutralization. The report also indicated that vibratory deburring wastewater was directed to the sanitary sewer [14].

According to a CT DEP December 1983 hazardous waste inspection report, Bristol Babcock employed 600 persons on two shifts. During this inspection, the CT DEP noted three separate outdoor hazardous waste storage areas on the property. None of the areas was bermed and the asphalt in each area was in need of repair [3]. The storage area contents and locations were not specified in the inspection report.

On December 10, 1984, the CT DEP conducted a Toxic Substances Control Act (TSCA) inspection of the Bristol Babcock property which involved a determination of the PCB content of nine on-site electrical transformers. During this inspection, the CT DEP identified 12 transformers and 22 capacitors on the property. It could not be determined why the three remaining transformers identified by the CT DEP were not tested. Only nine of the reported 12 transformers were observed during the WESTON/ARCS OSR. The capacitors were reportedly located in the building complex. The CT DEP observed no indications of on-going leakage during the inspection [9]. According to the CT DEP TSCA inspection report, General Electric (GE), the transformer manufacturer, determined that all 12 on-site transformers were PCB contaminated. GE reportedly retrofilled three of the 12 transformers with non-PCB oil in 1984. PCB concentrations ranged from 137 to 180 parts per million (ppm) [9]. It could not be determined from available file information why the remaining transformers were not retrofilled.

A 1984 metal plating wastewater discharge monitoring report indicated the following maximum element and compound concentrations: cadmium (0.04 milligrams per liter [mg/L]); copper (0.09 mg/L); nickel (0.23 mg/L); zinc (0.05 mg/L); total cyanide (0.02 mg/L); total phenol (0.034 mg/L); chloroform (40 ug/L); dichlorobromomethane (4 ug/L); TCA (6 ug/L) and TCE (100 ug/L) [18]. A Bristol Babcock 1985 discharge permit renewal indicated two regulated

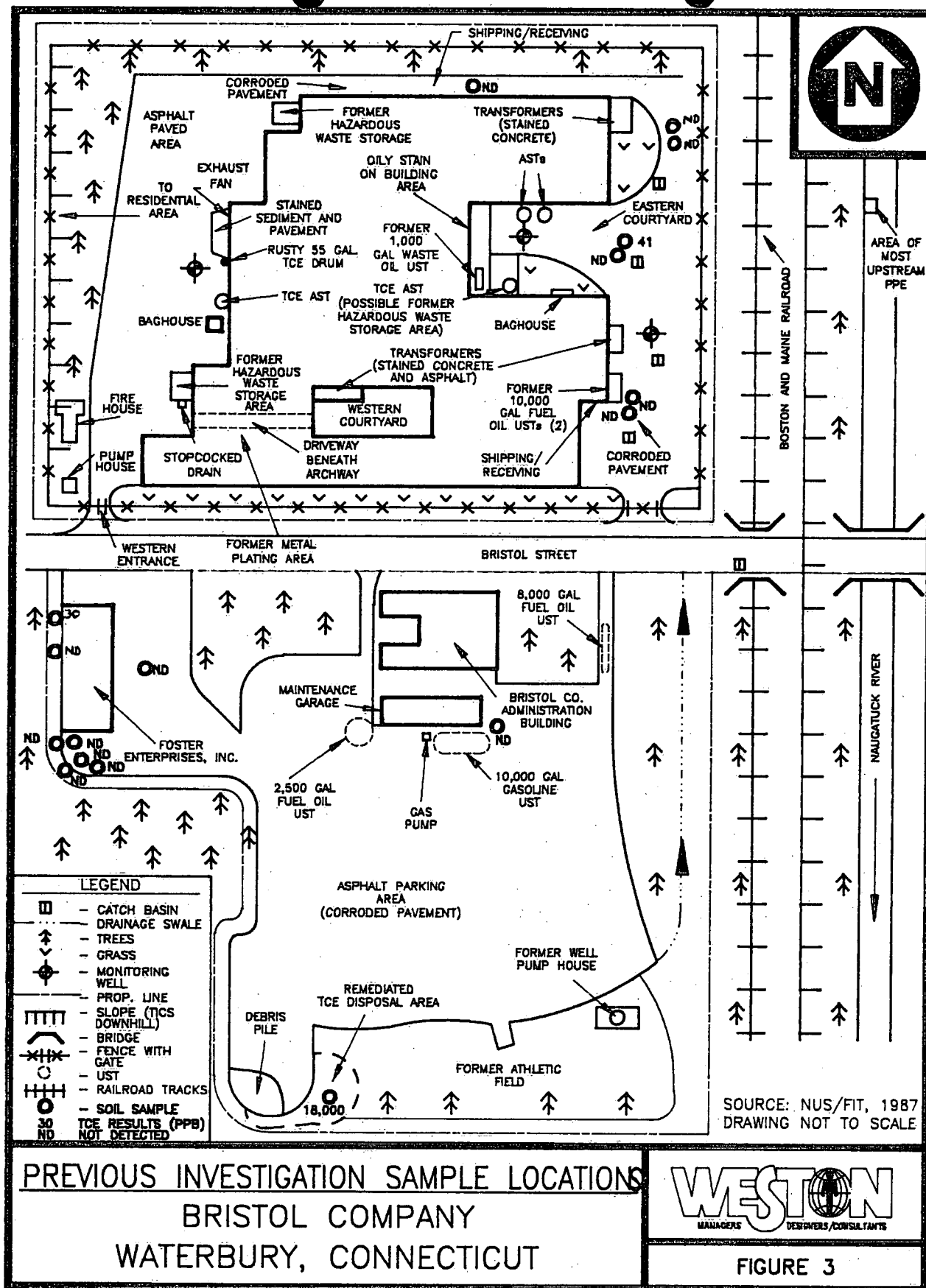
wastewater discharges: Discharge Serial No. 001 consisted of treated metal finishing wastewater and Discharge Serial No. 002 consisted of cooling water. Each discharge averaged 7,200 gpd [15]. At some time prior to 1985, two additional discharges for stormwater were included in the discharge permit. Correspondence from Bristol Babcock to the CT DEP in 1984, indicated that the stormwater discharges had been rerouted on an unspecified date to bypass the wastewater treatment system for direct discharge to the Naugatuck River [18].

Under the 1985 NPDES permit, Discharge 001 was to be monitored for copper, iron, nickel, zinc, total and amenable cyanide, total and free residual chlorine, total suspended solids and total toxic organics. In addition, a pH range of 6.0 to 9.5 was to be maintained, no visible discoloration or foaming of the receiving water was to be caused and the discharge temperature was not to exceed 85 degrees Fahrenheit. Under the permit, the temperature of discharge 002 was not to exceed 85 degrees Fahrenheit and the discharge was not to have caused a visible sheen, foam or floating solids on the receiving water [15].

In October 1985, Bristol Babcock received a notice from the CT DEP concerning discharge permit violations for amenable cyanide, the absence of cadmium in the wastewater permit's parameter monitoring specifications and the detection of excessive cadmium concentrations (0.53 milligrams per liter [mg/L]) in Discharge 001 [19]. The CT DEP modified the discharge permit to include effluent limits and monitoring requirements for cadmium in 1986 [17]. The CT DEP issued a separate violation notice for excess amenable cyanide and cadmium in Discharge 001 on May 5, 1988 [20].

An environmental assessment of the Bristol property was conducted by EEW Management, Inc. (EEWM) of Torrington, CT on November 1986 in preparation for the December 1986 sale of the property to Norman Drubner. The assessment included a survey of the property and buildings for signs of contamination and the collection of 17 subsurface soil samples from potential contamination source areas (Figure 3). Samples were analyzed for Extraction Procedure (EP) Toxicity metals and cyanide and volatile and aromatic hydrocarbons. Analytical methods and detection limits were not specified in available file information. Sample depths ranged from eight inches to 10 feet [8]. It could not be determined from available file information if the three on-site groundwater monitoring wells noted during the WESTON/ARCS OSR were associated with this assessment. No groundwater monitoring data were located in the State files.

No EP Toxic metals or cyanide were detected in the soil samples collected. TCE was detected at the south end of the employee parking lot (18,000 parts per billion [ppb]), on the west side of the Foster Enterprises building (30 ppb) and on the east side of the eastern courtyard (41 ppb) [8]. EEWM concluded that the probable source of TCE on the east side of the courtyard was from beneath the adjacent manufacturing buildings [21]. No information was available on potential TCE source around the Foster Enterprises building. Additional soil sampling was reportedly conducted in December 1987 to delineate the TCE contamination area at the south end of the employee parking lot, however these data were not located in available State file information. The TCE contamination at the south end of the property was reported to have resulted from unauthorized waste disposal by an unidentified individual or company, reportedly not associated with Bristol Babcock [22].



The NUS Corporation submitted a PA report on the Bristol Babcock operation to the EPA during March 1987. The PA discussed the alleged presence of a metal hydroxide sludge lagoon on the subject property and recommended a medium priority SI based on the historical quantities of hazardous waste generated on the property and the proximity of the property to the Naugatuck River [12].

On June 2, 1987, the CT DEP Hazardous Materials Management Unit issued a letter to EEWM concerning Bristol Babcock's listing on the CT DEP Inventory of Hazardous Waste Sites in Connecticut. According to the CT DEP, Bristol was placed on the list because of the alleged historical use of an on-site metal hydroxide sludge lagoon. However, the CT DEP was unable to confirm the presence of this lagoon based on a review of CT DEP files. The letter stated that based on CT DEP file information, Bristol should not have been on the inventory [23]. No further information was located in the State files regarding this issue.

A September 12, 1988 CT DEP interoffice memorandum indicated that Bristol Babcock had ceased all metal plating operations on August 22, 1988 and was in the process of selecting cleanup contractors for cleanup of the plating operation. Cleanup was to involve high pressure steam cleaning of floors, ceilings and equipment, disposal of residual plating baths and decontamination of a 550 gallon TCE above ground storage tank [24]. On October 30, 1989 the CT DEP revoked Bristol Babcock's wastewater discharge permit following the company's ceasing of all plating operations during September 1988 [25]. It could not be determined from the site contact or available file information if cleanup of the plating operation was implemented.

Available documentation indicates that the excavation of TCE contaminated soil from south of the employee parking lot was initiated under CT DEP guidance, during the summer of 1988. Excavated soil was spread over the parking lot for aeration to achieve TCE concentrations below the CT DEP drinking water action level for TCE of 5.0 ppb [26]. Soil aeration took place on the employee parking lot between 1988 and 1990 [27].

On July 13, 1989, the CT DEP Water Compliance Unit provided a written authorization for Bristol to undertake a cleanup and closure of the facility in accordance with documentation prepared by Bristol Babcock and ESI-ACES [27]. Cleanup tasks were not specified in this correspondence. No further information was available on the implementation of closure activities.

ESI-ACES submitted a remediation status report to the CT DEP in November 1989. Of the 2,500 cubic yards of soil excavated from the TCE disposal area, 1,600 cubic yards were reportedly aerated to below 5.0 ppb by November 1989. ESI-ACES collected confirmatory soil samples from the excavation sidewalls and bottom to verify the absence of TCE, prior to requesting CT DEP approval for backfilling the excavation with clean fill in this November 1989 report. Analytical results from past excavation samples were not located in the State files. ESI-ACES also requested, on behalf of Bristol Babcock, CT DEP approval to remove and dispose of the remaining 900 cubic yards of excavated soil as a non-hazardous industrial waste [22].

Matty's Paving and Construction Company of Watertown, CT removed two 10,000 gallon No. 4 fuel oil USTs in a masonry vault on the east side of the complex, one 1,000 gallon waste oil

UST in the eastern courtyard and one 8,000 gallon fuel oil UST on the east side of the administration building in November 1989. Matty's reported that approximately 42 cubic yards of oil contaminated sand were removed from inside the fuel oil UST vault and that oil spillage from over-filling had been contained within the vault [29]. One post excavation soil sample was collected from each of the excavations and tested for total petroleum hydrocarbons (TPH) using EPA Method 418.1 and a detection limit of 50 milligrams per kilogram (mg/kg). Analytical results for the vault excavation were below detection limits. 125 mg/kg TPH were detected in the waste oil tank excavation sample [29,30]. No analytical results were located for the administration building tank. Based on analytical results, Matty's recommended further soil excavation of the waste oil tank grave [30]. No further information, including information on the status of the administration building UST, was located in the State files.

Bristol received CT DEP approval for off-site disposal of the remaining TCE contaminated soil and backfilling of the TCE disposal area excavation at the south end of the property in December 1989 and March 1990. The March 1990 approval included a requirement for Toxicity Characteristic Leaching Procedure (TCLP) testing of a portion of the remaining 1,100 cubic yards of excavated soil [31]. Analytical results were not located in available file information. The off-site hauling and disposal of the remaining excavated soil and backfilling of the excavation was completed in August 1990 [27].

December 1991 internal memoranda from the CT DEP indicate that Bristol Babcock sent several 55 gallon drums of polychlorinated biphenyl (PCB) contaminated cutting and machine oil to Environmental Waste Resources, Inc. (EWR) of Waterbury, CT for disposal and that EWR rejected the drums based on incorrect analyses which did not indicate the presence of PCBs. EWR analyses indicated 1,022 ppm and 109 ppm of PCB Aroclor 1242 in two of the waste oil drums. The waste oil was reportedly generated from the cleaning of hydraulic screw machines during plant closure [32]. Clean Harbors, Inc. of Braintree, MA reportedly disposed of the rejected drums [33].

After receiving an anonymous complaint of vandalized electrical transformers on the Bristol property in August 1992, the CT DEP PCB Group conducted a site survey and collected oil samples from two transformers during the same month. The CT DEP did not indicate which transformers were sampled. Analytical results indicated total PCB concentrations of 160 ppm and 4.4 ppm in the two transformers [34].

Based on these analytical results, the CT DEP issued a Notice of Violation to the property owner in September 1992, which gave him 30 days to remediate any PCB oil spills. The CT DEP reported that the owner retained EWR, Inc. to remediate the spills in October 1992 [35]. No further information was available on the remediation or any additional testing.

Table 1 presents structures or areas identified on the Bristol property that are potential sources of contamination, the containment factors associated with each source, and the relative location of each source.

Table 1

Source Evaluation for the Bristol Company

| Potential Source Area | Containment Factors | Spatial Location |
|--|--|---|
| Former Outdoor Hazardous Substance and Waste Storage Areas (3) | Asphalt floors and berms (two western areas; concrete slab (eastern area). | Two on west side of industrial complex; one possibly located in eastern courtyard. |
| Former Empty Drum Storage Area | Asphalt pavement | Beneath building archway at western courtyard entrance. |
| Baghouses (2) | None | One on west side of complex; one in eastern courtyard. |
| Outdoor Above Ground Bulk TCE Storage Tanks (4) | Concrete and asphalt beneath tanks | One tank on west side of complex; three tanks in eastern courtyard. |
| Former Petroleum Product USTs (5) | None | Two - 10,000 gal. fuel oil USTs on east side of industrial complex; one 8,000 gal. fuel oil UST on east side of admin. building; one 10,000 gal. gasoline UST on south side of garage and one 2,500 fuel oil UST at southwest corner of garage. |
| Former Waste Oil UST | None | One 1,000 gal. UST in eastern courtyard. |
| TCE Drum | Asphalt pavement | West side of industrial complex. |
| Stained Sediment Area | Asphalt beneath sediment | West side of building beneath exhaust fan. |
| Electrical Transformers (12) and Capacitors (22) | Concrete pads and asphalt | Three outdoor transformers in western courtyard and six outdoor transformers on east side of complex. Remainder of transformers and capacitors inside building interiors. |
| Former Metal Plating Shop | Building floors, walls and ceilings | Southwest corner of complex. |
| Former Wastewater Treatment Plant | Building floors, walls and ceilings | Unknown. |
| Former NPDES Discharge | None | Former discharge to Naugatuck River. |
| Former Screw Machine Area | Building floors and walls | Unknown |
| Former Paint Spraying Area | Building floors and walls | Unknown |
| Former Metal Processing Area | Building floors and walls | Unknown |
| Former Welding/Soldering Area | Building floors and walls | Unknown |
| Former TCE Disposal Area | None | South of employee parking lot. |
| TCE Contamination Areas (2) | None | Eastern courtyard and west side of Foster Enterprises building. |
| Miscellaneous Debris Area | None | South end of employee parking lot. |
| Drainage Swale | None | East of employee parking lot. |

[2]

Table 2 summarizes the types of potentially hazardous substances and wastes which have been used, stored or disposed on the property.

Table 2
Hazardous Waste Quantity for the Bristol Company

| Substance | Quantity or Volume/Area * | Years of Use/Storage | Years of Disposal | Source Area |
|-------------------------------------|---------------------------|----------------------|-------------------|-------------|
| Virgin TCE | 2,000 gal/yr | 1920-1988 | N/A | N/A |
| Waste TCE | 45 gal/yr | 1920-1988 | N/A | N/A |
| Virgin TCA | Unknown | Unknown | N/A | N/A |
| Waste TCA | Unknown | Unknown | N/A | N/A |
| Scrap Metal | Unknown | Unknown | N/A | N/A |
| Epoxy and Enamel Paints | 1,000 gal/yr | 1897-1988 | N/A | N/A |
| Waste Paint/Paint Thinner | 190 gal/yr | 1897-1988 | N/A | N/A |
| Wastewater Treatment Sludge | 750 gal/yr | 1971-1988 | N/A | N/A |
| Treated Wastewater | 14,440 gpd | 1971-1988 | 1971-1988 | N/A |
| Virgin Acids | 2,000 gal/yr | 1897-1988 | N/A | N/A |
| Waste Acids | 880 gal/yr | 1897-1988 | N/A | N/A |
| Virgin Cutting and Lubricating Oils | 3,000 gal/yr | 1897-1988 | N/A | N/A |
| Waste Cutting and Lubricating Oils | 1,800 gal/yr | 1897-1988 | N/A | N/A |
| Methylene Chloride | Unknown | Unknown | N/A | N/A |
| Dimethyl Phthalate | Unknown | Unknown | N/A | N/A |
| Cyanide Waste | 300 gal/yr | 1897-1988 | N/A | N/A |
| Toluene | Unknown | Unknown | N/A | N/A |
| Chloroform | Unknown | Unknown | N/A | N/A |

* = Quantities estimated from available file and site contact information.

gal/yr = Gallons Per Year

gpd = Gallons Per Day

N/A = Not Applicable. No information was obtained from file records and site contact indicating that the chemicals listed above had been historically disposed of on-site.

[2,3,12,13,14,15]

There are 177 notifiers listed in the RCRA Generators in Region I Active and Inactive Town Listing and 31 CERCLIS sites potentially located within one mile of the Bristol property. The closest CERCLIS sites to the property are the Hubbard Hall Chemical Company and the South End Disposal Area, located approximately three quarters mile to the north [36,37].

WASTE/SOURCE SAMPLING

On December 18, 1992, WESTON/ARCS collected eight soil samples from potential on-site source areas and one reference soil from an area presumed to be undisturbed (Table 3, Figure 4). Soil samples were submitted for full organic, total metals, and cyanide analyses through the EPA Contract Laboratory Program (CLP).

Table 3

**Sample Summary: Bristol Company
Source Samples Collected by WESTON/ARCS on December 18, 1992**

| Sample Location No. | Traffic Report No. | Time | Remarks | Sample Source |
|---------------------|--------------------|------|----------------------------------|--|
| MATRIX: Soil | | | | |
| SS-01 | ACL56 MAAT56 | 1435 | Grab, Depth = 1.5 to 2.0 feet | Thirteen feet south of southern transformer pad on east side of industrial complex. |
| SS-02 | ACL57 MAAT57 | 1435 | Grab, Depth = 1.5 to 2.0 feet | Duplicate of sample SS-01 for quality control. |
| SS-03 | ACL58 MAAT58 | 1410 | Grab, Depth = 1.5 to 2.0 feet | Ten feet north of baghouse in grassy area of eastern courtyard (MS/MSD for quality control). |
| SS-04 | ACL59 MAAT59 | 1250 | Grab, Depth = 2.0 to 2.5 feet | Former waste oil UST area in eastern courtyard, three feet from building east wall. |
| SS-05 | ACL60 MAAT60 | 1230 | Grab, Depth = 1.5 to 2.0 feet | Beneath northern paved former hazardous waste storage area on west side of complex. |
| SS-06 | ACL61 MAAT61 | 1115 | Grab, Depth = 1.5 to 2.0 feet | Area of stained sediment and pavement on west side of industrial complex, five feet west of building wall. |
| SS-07 | ACL62 MAAT62 | 1015 | Grab, Depth = 1.5 to 2.0 feet | West side of industrial complex, five feet north of former above ground TCE tank. |
| SS-08 | ACL63 MAAT63 | 0915 | Grab, Depth = 1.5 to 2.0 feet | Beneath center of southern paved former hazardous waste storage area on west side of complex. |
| SS-09 | ACL64 MAAT64 | 0945 | Grab, Depth = 1.5 to 2.0 feet | Wooded slope on western side of west driveway, 80 feet west of industrial complex (reference sample). |
| RB-04 | ACL66 MAAT66 | 1400 | Grab, N/A | Soil sampling equipment rinsate for quality control. |
| TB-12 | ACL67 N/A | 0815 | Grab, N/A | Trip blank for quality control |

Grab = Grab sample

N/A = Not applicable

MS/MSD = Matrix Spike/Matrix Spike Duplicate

[2]

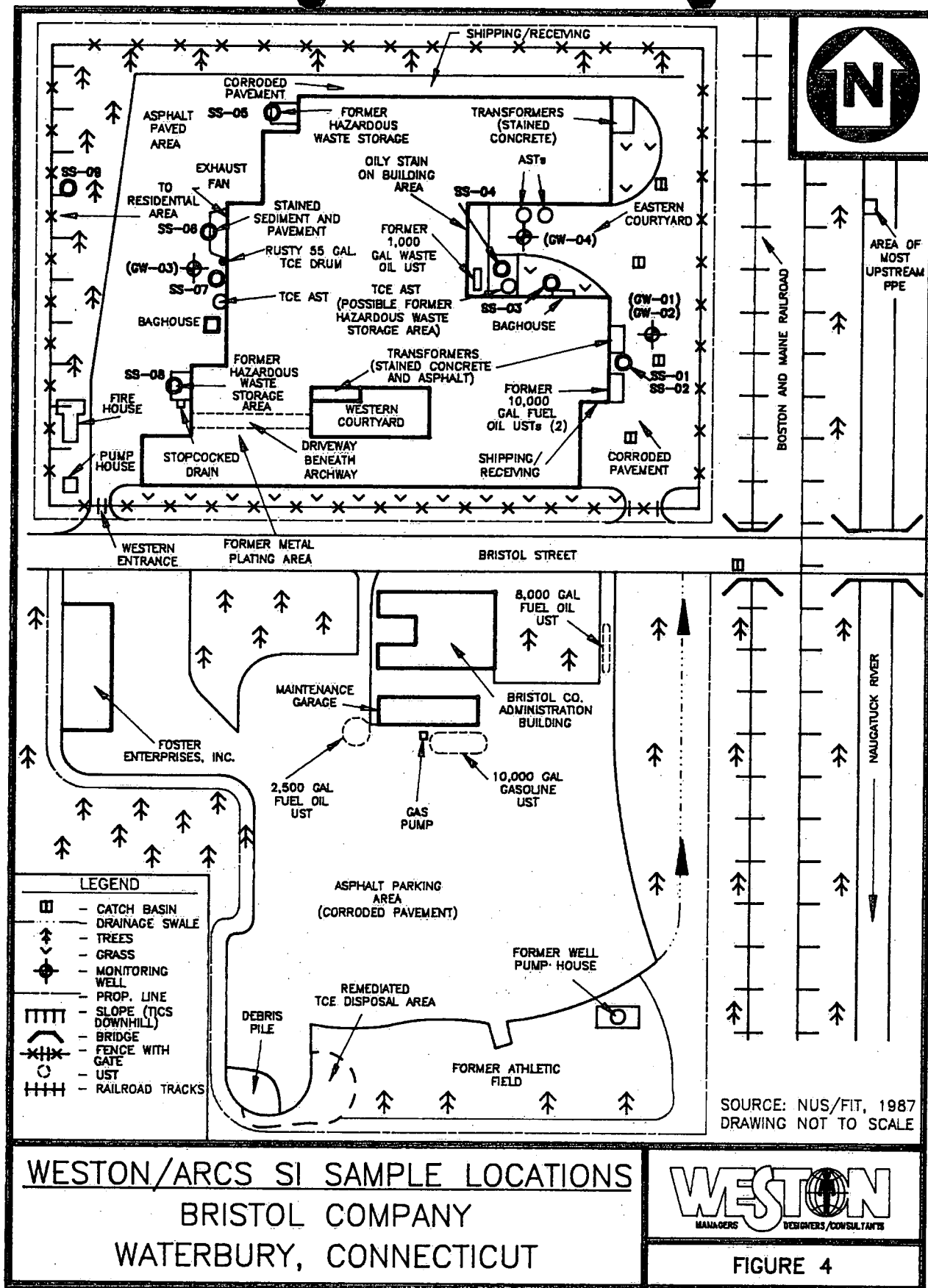


Table 4 is a summary of compounds and elements detected through CLP analyses of WESTON/ARCS soil samples. For each sample location, a compound or element is listed if it is detected at three times or greater than the reference sample concentration (SS-09). Compounds or elements which occur at a concentration three times or greater than the reference concentration are designated by their approximate relative concentrations above the reference value. If the element or compound is not detected in the reference sample, the sample quantitation limit (SQL) (for organic analyses) or sample detection limit (SDL) (for inorganic analyses) is used as the reference value. Accordingly, compounds or elements are reported by their relative concentrations with respect to the reference sample location's SQL or SDL if they occur at a value equal to or greater than the reference sample's SQL or SDL.

Table 4

**Summary of Analytical Results:
Source Sample Analysis for the Bristol Company**

| Sample Location No. | Compound/Element | Concentration | Reference Concentration | Comments |
|--------------------------|-----------------------|---------------|-------------------------|---------------|
| SS-01 ACL56 MAAT56 | Acetone | 120 ug/kg J | 13 ug/kg U | 9.23 x SQL |
| | Endosulfan Sulfate | 9.5 ug/kg J | 4.3 ug/kg UJ | 2.2 x SQL |
| | Potassium | 2,420 mg/kg | 692 mg/kg | 3.5 x REF |
| SS-02 ACL57 MAAT57 | Acetone | 35 ug/kg J | 13 ug/kg J | 2.7 x SQL |
| SS-03 ACL58 MAAT58 | Trichloroethene | 110 ug/kg J | 13 ug/kg U | 8.5 x SQL |
| | Mercury | 7.40 mg/kg | 0.15 mg/kg | 49.3 x REF |
| SS-04 ACL59 MAAT59 | Acetone | 64,000 ug/kg* | 13 ug/kg U | 4,923.1 x SQL |
| | 1,1-Dichloroethane | 76 ug/kg | 13 ug/kg U | 5.9 x SQL |
| | 1,2-Dichloroethene | 7,000 ug/kg* | 4.0 ug/kg J | 1,750 x REF |
| | 1,1,1-Trichloroethane | 81 ug/kg | 13 ug/kg U | 6.2 x SQL |
| | Trichloroethene | 6,500 ug/kg* | 13 ug/kg U | 500 x SQL |
| | 1,1,2-Trichloroethane | 13 ug/kg J | 13 ug/kg U | 1.0 x SQL |
| | Tetrachloroethene | 700 ug/kg | 13 ug/kg U | 53.8 x SQL |
| | Fluoranthene | 440 ug/kg J | 140 ug/kg J | 3.1 x REF |
| | Pyrene | 1,000 ug/kg J | 140 ug/kg J | 7.1 x REF |
| | Chrysene | 1,900 ug/kg J | 76 ug/kg J | 25 x REF |

Table 4

**Summary of Analytical Results:
Source Sample Analysis for the Bristol Company
(Continued)**

| Sample Location No. | Compound/Element | Concentration | Reference Concentration | Comments |
|--|-----------------------|---------------|-------------------------|------------|
| SS-04 ACL59 MAAT59 (cont'd) | Aroclor 1254 | 240 ug/kg J | 43 ug/kg UJ | 5.6 x SQL |
| | Calcium | 1,790 mg/kg | 554 mg/kg | 3.2 x REF |
| | Copper | 462 mg/kg J | 45.1 mg/kg J | 10.2 x REF |
| | Mercury | 1.2 mg/kg | 0.15 mg/kg | 8.0 x REF |
| | Nickel | 30.0 mg/kg | 9.4 mg/kg | 3.2 x REF |
| | Potassium | 5,500 mg/kg | 692 mg/kg | 8.0 x REF |
| SS-05 ACL60 MAAT60 | 1,1-Dichloroethane | 31 ug/kg J | 13 ug/kg J | 2.4 x SQL |
| | 1,2-Dichloroethene | 1,900 ug/kg | 4.0 ug/kg J | 475 x REF |
| | 1,1,1-Trichloroethane | 740 ug/kg | 13 ug/kg U | 56.9 x SQL |
| | Trichloroethene | 400 ug/kg | 13 ug/kg U | 30.8 x SQL |
| | Tetrachloroethene | 160 ug/kg | 13 ug/kg U | 12.3 x SQL |
| | Aroclor 1254 | 940 ug/kg J | 43 ug/kg UJ | 21.9 x SQL |
| | Cadmium | 10.0 mg/kg | 0.41 mg/kg U | 24.3 x SDL |
| | Copper | 422 mg/kg J | 45.1 ug/kg J | 9.4 x REF |
| | Potassium | 2,420 mg/kg | 692 mg/kg | 3.5 x REF |
| | Zinc | 289.0 mg/kg | 81.3 mg/kg | 3.6 x REF |
| | Cyanide | 0.81 mg/kg | 0.65 mg/kg U | 1.2 x SDL |
| | | | | |
| SS-06 ACL61 MAAT61 | Trichloroethene | 69 ug/kg | 13 ug/kg U | 5.3 x SQL |
| | Aroclor 1254 | 57 ug/kg J | 43 ug/kg UJ | 1.3 x SQL |
| | Chromium | 99.8 mg/kg | 10.7 mg/kg | 9.3 x REF |
| | Mercury | 0.67 mg/kg | 0.15 mg/kg | 4.5 x REF |
| | Potassium | 2,280 mg/kg | 692 mg/kg | 3.3 x REF |
| SS-07 ACL62 MAAT62 | Acetone | 190 ug/kg | 13 ug/kg U | 14.6 x SQL |
| | Trichloroethene | 140 ug/kg | 13 ug/kg U | 10.8 x SQL |

Table 4

**Summary of Analytical Results:
Source Sample Analysis for the Bristol Company
(Concluded)**

| Sample Location No. | Compound/Element | Concentration | Reference Concentration | Comments |
|--------------------------|------------------|---------------|-------------------------|-----------|
| SS-08 ACL63 MAAT63 | Trichloroethene | 62 ug/kg | 13 ug/kg U | 4.8 x SQL |
| | Cadmium | 2.5 mg/kg | 0.41 mg/kg U | 6.1 x SDL |
| | Lead | 205 mg/kg | 33.1 mg/kg | 6.2 x REF |
| | Potassium | 2,670 mg/kg | 692 mg/kg | 3.9 x REF |

- J = Quantitation is approximate due to limitations identified during the quality control review.
- U = The compound was analyzed for; but, was not detected. The associated numerical value is the sample quantitation limit.
- UJ = Reported quantitation limits are qualified estimated.
- mg/kg = Milligrams per Kilogram
- ug/kg = Micrograms per Kilogram
- REF = Reference Concentration
- SQL = Sample Quantitation Limit
- SDL = Sample Detection Limit
- * = Result reported from medium level analysis.

Note: Aliquots analyzed for volatile organic compounds were collected as grab samples.
[38,39,40]

The complete analytical results of the WESTON/ARCS sampling activities, including quantitation and detection limits, are presented in Attachment A. Sample results qualified with a "J" on the analytical tables are considered approximate because of limitations identified during the CLP data validation. In addition, organic sample results reported at concentrations below quantitation limits and confirmed by mass spectrometry are also qualified by a "J" and considered approximate.

With the exception of samples SS-03 and SS-09, all soil samples consisted of fine to medium sand, some silt and gravel. Samples SS-03 and SS-09 consisted of brown fine sandy loam. An oily odor was noted in samples SS-04 and SS-05. Small pieces of chalky white material were observed in sample SS-05 [2].

Several volatile organic compounds (VOCs) were detected in the WESTON/ARCS soil samples. The most commonly occurring VOC was TCE, detected in all samples except SS-01, SS-02 (east side of property) and SS-09 (reference sample). The highest TCE concentration (6,500 ug/kg) was detected at location SS-04, the former location of the waste oil UST, approximately 25 feet from an existing above ground TCE bulk storage tank. TCE is known to have been handled in large quantities on the site during its operational history [2,13].

The greatest number of VOCs was detected at locations SS-04 and SS-05. Location SS-04 is

located at the approximate former location of the waste oil UST, approximately 30 feet east of an unbermed partially sheltered outdoor area which may have been used historically for temporary product or waste storage. The highest VOC concentration (acetone - 64,000 ug/kg), was also detected at location SS-04. Acetone was also detected at locations SS-01, SS-02 and SS-07. Although the historic use of acetone could not be confirmed from available file information, acetone is a commonly used industrial solvent frequently used in paint and varnish remover and for cleaning of precision parts [61]. Sample SS-05 was collected from beneath the asphalt pad of a former hazardous waste storage area, suggesting historical releases from this area.

Several semi-volatile organic compounds (SVOCs) were detected at location SS-04. These compounds are indicative of heavy oils and their presence is consistent with this location's former use for waste oil storage.

Mercury was the most frequently detected metal (locations SS-03, SS-04, and SS-06). The historic use of mercury on the property could not be determined from available file information. However, given the site's long industrial history and its use for metal working, the historic use of mercury is possible. Copper, detected at locations SS-04 and SS-05 and cadmium, detected at locations SS-05 and SS-08, may be attributable to the former cadmium and copper plating operation or the historic machining of brass bar stock. A major component of brass is copper.

The PCB Aroclor 1254 was detected at locations SS-04, SS-05 and SS-06. The PCB Aroclor 1242 was detected in waste hydraulic oil used in on-site screw machines and in electrical transformer oil. Given the documented presence of PCBs on the property, the PCBs detected in WESTON/ARCS samples are likely the result of historical on-site activities. No pesticides were detected in WESTON/ARCS soil samples.

GROUNDWATER PATHWAY

The Bristol property is underlain by the Waterbury Gneiss Formation, consisting of fine to medium grained schist and gneiss [41]. Depth to bedrock is estimated to be greater than 15 feet based on observations of the absence of bedrock outcrops on and around the site and regional topography [2,41]. There are no known bedrock faults within one mile of the property [41].

Surficial deposits on the eastern third of the property are mapped as alluvium, derived from the Naugatuck River, overlying undifferentiated sands and gravel. The alluvium consists primarily of silt, sand and gravel. These surficial deposits may be as much as 25 feet thick along the Naugatuck River [42]. However, because of the site's distance from the river, a thinner surficial deposit layer is anticipated. Surficial deposits on the western two-thirds of the property are mapped as well to poorly sorted alternating layers of sand and gravel [42]. Given the site's long industrial history, the presence of fill on the property is possible [2].

Soil beneath the Bristol site is mapped as part of the Agawam-Merrimac-Hinckley Series, deep, well drained to excessively well drained soils with a sandy and gravelly substratum, on terraces [43]. Net precipitation in the area is estimated as 20 inches per year, including the effects of lake evaporation [44].

According to the CT DEP, groundwater beneath the site is classified as "GA". Groundwater with this classification is within the area of influence of private and public wells and is presumed suitable for direct human consumption without the need for treatment. The State's goal is to maintain drinking water quality [45,46]. Based on groundwater level measurements taken by WESTON/ARCS from the steel rims of three existing on-site flush mounted monitoring wells, groundwater depth ranges from approximately three to nine feet below the ground surface [2]. Observations of local topography and drainage suggest that groundwater flow beneath the property is toward the east and the Naugatuck River [2].

The Bristol property and the surrounding area are provided with public water service from the Connecticut Water Company, Naugatuck Division. Approximately 99 percent of the City of Waterbury receives its water supply from a series of surface reservoirs approximately eight miles north of the site [12,47]. The nearest private well to the site is located approximately one-third of a mile to the southwest [6]. The nearest public well is located approximately 2.2 miles southwest in Naugatuck, CT [7]. An estimated 9,615 and 3,679 persons are served by private and public water supplies within four miles of the property, respectively [6,7,12,45,46,48,49,50]. There are no wellhead protection areas in the Bristol vicinity. Two Marks Brook public wells, operated by the Connecticut Water Company-Naugatuck Division, are reportedly blended with a series of surface water supplies operated by the same company. The wells are located approximately 3.2 miles southeast of the Bristol Site in Naugatuck, and contribute approximately 25 percent (1,750 people) of the total supply. According to the site contact, Bristol used a production well located on the south end of the property for process water. No information regarding the period of usage, production rates or water quality was available [2].

Private well user populations were determined through conversations with the Waterbury Water Bureau and the Connecticut Water Company, and by apportioning U.S. Census town population data and the estimated percent of private well users for each town within four miles of the site by radial distance ring. Populations using public well water within each radial distance ring were obtained from the CT DEP "Atlas of Public Water Supply Sources and Drainage Basins in Connecticut" and the Community Water Systems in CT map and the CT Department of Health Services (DHS) public well user database [6,7,47,48,49,50,60]. Table 5 summarizes public groundwater supply sources within four miles of the Bristol site. Table 6 summarizes the estimated population served by all groundwater sources within four miles of the site by radial ring.

Table 5**Public Groundwater Supply Sources Within Four Miles
of the Bristol Company**

| Distance/ Direction from Site | Source Name | Location of Source | Estimated Population Served | Source Type |
|-------------------------------------|---|-----------------------|-----------------------------------|---------------|
| 2.2 miles SW | Idleview Mobile Home Park | Naugatuck | 232 | Unknown |
| 2.2 miles SE | Indian Spring Water Company Wells 1-5 and 7 * | Naugatuck | 0 | Unknown |
| 2.6 miles SE | Connecticut Water Company-Naugatuck Division Spring Road Well (2) | Prospect | 900 | Gravel packed |
| 2.6 miles NW | Middlebury Commons | Middlebury | 76 | Unknown |
| 2.7 miles SE | Highland Heights Water Company | Prospect | 51 | Unknown |
| 3.1 miles SE | Indian Spring Water Company Well 6 * | Naugatuck | 0 | Unknown |
| 3.2 miles SE | Connecticut Water Company-Naugatuck Division Marks Brook Well (2) ** | Naugatuck | 1,750 | Gravel packed |
| 3.4 miles SE | Gendron's Valley Mobile Home Park | Naugatuck | 195 | Unknown |
| 3.4 miles NW | Westover Water Company | Middlebury | 450 | Unknown |
| 3.9 miles SE | Sydoriak Apartments | Prospect | 25 | Unknown |
| TOTAL | | | 3,679 | |

* = Wells abandoned approximately 1975 due to inadequate supply. Indian Spring Water Company since taken over by Connecticut Water Supply Company.

** = Marks Brook wells contribute a maximum of 25 percent of total supply which is blended with a series of surface water reservoirs.

[7,47,48,49,50]

Table 6

**Estimated Drinking Water Populations Served by Groundwater Sources
Within Four Miles of the Bristol Company**

| Radial Distance From M S Chambers (miles) | Estimated Population Served by Private Wells | Estimated Population Served by Public Wells | Total Estimated Population Served by Groundwater Sources Within Ring |
|--|---|--|---|
| 0.00 < 0.25 | 0 | 0 | 0 |
| 0.25 < 0.50 | 153 | 0 | 153 |
| 0.50 < 1.00 | 451 | 0 | 451 |
| 1.00 < 2.00 | 1,808 | 0 | 1,808 |
| 2.00 < 3.00 | 3,010 | 1,259 | 4,269 |
| 3.00 < 4.00 | 4,193 | 2,420 | 6,613 |
| TOTALS | 9,615 | 3,679 | 13,294 |

[6,7,12,47,48,49,50,60]

The presence of three groundwater monitoring wells on the Bristol property indicates that groundwater has probably been sampled in the past. However, WESTON/ARCS was unable to locate any groundwater data in the State files or with the site contact.

On December 18, 1992, WESTON/ARCS collected four groundwater samples, including a reference and duplicate sample, from on-site monitoring wells (Figure 4). Table 7 presents a summary of groundwater samples collected by WESTON/ARCS on December 18, 1992. All samples were submitted for full organic, total metals and cyanide analysis through the EPA CLP. WESTON/ARCS groundwater samples were not filtered. According to the site contact, the former on-site production well had not been used for an undetermined period before Bristol operations ceased. WESTON/ARCS did not attempt to sample this well.

Table 7

**Sample Summary: Bristol Company
Groundwater Samples Collected by WESTON/ARCS
on December 18, 1992**

| Sample Location No. | Traffic Report No. | Time | Remarks | Sample Source | Well Depth |
|----------------------------|--------------------|------|---------------------------|---|------------|
| MATRIX: Groundwater | | | | | |
| GW-01 | ACL68 MAAY68 | 1000 | Grab, Depth = 9.0 feet | East-central portion of property near electrical transformers. | 14.73' |
| GW-02 | ACL69 MAAY69 | 1000 | Grab, Depth = 9.0 feet | Duplicate of sample GW-01 for quality control. | 14.73' |
| GW-03 | ACL70 MAAY70 | 1315 | Grab, Depth = 6.0 feet | West side of industrial complex, 10 feet west of building wall (reference sample). | 12.25' |
| GW-04 | ACL71 MAAY71 | 1200 | Grab, Depth = 3.2 feet | Eastern courtyard, 10 feet south of above ground storage tank (MS/MSD for quality control). | 12.50' |
| RB-05 | ACL74 MAAY74 | 1330 | Grab, N/A | Groundwater sampling equipment rinsate for quality control. | N/A |

Grab = Grab sample

N/A = Not applicable

MS/MSD = Matrix Spike/Matrix Spike Duplicate

[2]

Table 8 is a summary of compounds and elements detected through CLP analyses of WESTON/ARCS groundwater samples. For each sample location, a compound or element is listed if it is detected at three times or greater than the reference sample concentration (GW-03). Compounds or elements which occur at a concentration three times or greater than the reference concentration are designated by their approximate relative concentrations above the reference value. If the element or compound is not detected in the reference sample, the SQL (for organic analyses) or SDL (for inorganic analyses) is used as the reference value. Accordingly, compounds or elements are reported by their relative concentrations with respect to the reference sample location's SQL or SDL if they occur at a value equal to or greater than the reference sample's SQL or SDL.

Table 8

**Summary of Analytical Results:
Groundwater Sample Analysis for the Bristol Company**

| Sample Location No. | Compound/Element | Concentration | Reference Concentration | Comments |
|--------------------------|-----------------------|---------------|-------------------------|------------|
| GW-01 ACL68 MAAY68 | 1,1-Dichloroethane | 16 ug/L J | 10 ug/L U | 1.6 x SQL |
| | 1,1,1-Trichloroethane | 36 ug/L J | 4.0 ug/L J | 9.0 x REF |
| | Trichloroethene | 1,200 ug/L | 180 ug/L | 6.7 x REF |
| | Naphthalene | 15 ug/L | 10 ug/L U | 1.5 x SQL |
| | 2-Methylnaphthalene | 23 ug/L | 10 ug/L U | 2.3 x SQL |
| | Cadmium | 18.1 ug/L | 1.4 ug/L | 12.9 x SDL |
| GW-02 ACL69 MAAY69 | Acetone | 260 ug/L | 10 ug/L U | 26.0 x SQL |
| | 1,1-Dichloroethane | 16 ug/L | 10 ug/L U | 1.6 x SQL |
| | 1,1,1-Trichloroethane | 35 ug/L J | 4.0 ug/L J | 8.75 x REF |
| | Trichloroethene | 1,100 ug/L | 180 ug/L | 6.1 x REF |
| | Naphthalene | 16 ug/L | 10 ug/L U | 1.6 x SQL |
| | 2-Methylnaphthalene | 19 ug/L | 10 ug/L U | 1.9 x SQL |
| | Cadmium | 18.0 ug/L | 1.4 ug/L | 12.9 x SDL |
| GW-04 ACL70 MAAY70 | 1,1-Dichloroethane | 32 ug/L | 10 ug/L U | 3.2 x SQL |
| | 1,2 Dichloroethene | 4 ug/L | 1 ug/L J | 4 x REF |
| | Flourene | 29 ug/L | 10 ug/L U | 2.9 x SQL |
| | 2-Methylnaphthalene | 27 ug/L | 10 ug/L U | 2.7 x SQL |
| | Phenanthrene | 140 ug/L J | 10 ug/L U | 14.0 x SQL |
| | Aroclor 1254 | 16 ug/L J | 1.1 ug/L U | 14.5 x SQL |
| | Arsenic | 6.1 ug/L J | 2.0 ug/L UJ | 3.0 x SDL |
| | Mercury | 0.16 ug/L J | 0.1 ug/L | 1.6 x SDL |
| | Cyanide | 17.0 ug/L | 10.0 ug/L | 1.7 x SDL |
| | Zinc | 20,990 ug/L | 498 ug/L | 42.2 x REF |

J = Quantitation is approximate due to limitations identified during the quality control review.

U = The compound was analyzed for; but, was not detected. The associated numerical value is the sample quantitation limit.

mg/L = Milligrams per Liter

ug/L = Micrograms per Liter

REF = Reference Concentration

SQL = Sample Quantitation Limit

SDL = Sample Detection Limit

Note: Aliquots analyzed for volatile organic compounds were collected as grab samples.

[38,39,40]

The complete analytical results for the WESTON/ARCS groundwater sampling activities, including quantitation and detection limits, are presented as Attachment A. Sample results qualified with a "J" on the analytical tables are considered approximate because of limitations identified during the CLP data validation. In addition, organic sample results reported at concentrations below quantitation limits and confirmed by mass spectrometry are also qualified by a "J" and considered approximate.

Samples GW-01 and GW-02 had a petroleum odor and oily sheen. Sample GW-04 had an approximately six inch to one foot thick layer of floating oily product. No odor or sheen were noted in sample GW-03 [2].

The VOC, TCE was detected in samples GW-01 (1,200 ug/L) and GW-02 (1,100 ug/L) at concentrations over 200 times above the Federal Maximum Contaminant Level (MCL) of 5.0 ug/L [51]. TCE is known to have been stored in bulk in on-site outdoor areas and used in on-site processes. The 1,1,1-TCA concentration detected at location GW-01 (36 ug/L J) is below the Federal MCL (200 ug/L) [51]. This compound has also been used historically on the property. The acetone detected in sample GW-02 is consistent with that detected in soil sample SS-01, collected approximately 20 feet to the southwest. No MCL has been established for acetone. The 1,2-dichloroethene concentration detected in sample GW-04 (4 ug/L J) is below the 100 ug/L Federal MCL for this compound [51]. No MCL has been established for 1,1-dichloroethane. The PCB Aroclor 1254 concentration detection in sample GW-04 (16 ug/L) is 32 times the PCB drinking water MCL of 0.5 ug/L. Several SVOCs, were detected in groundwater. No MCLs exist for these compounds [51].

The cadmium concentrations detected in samples GW-01 (18.1 ug/L) and GW-02 (18.0 ug/L) are approximately 3.6 times the Federal drinking water MCL of 5 ug/L [51]. Cadmium has historically been used on-site in metal plating. The arsenic concentration of 6.1 ug/L J detected in sample GW-04 is below the 50 ug/L MCL for arsenic [51]. The mercury concentration detected in sample GW-04 (0.16 ug/L J) is below the 2 ug/L MCL. The cyanide concentration detection in sample GW-04 (17.0 ug/L) is below the drinking water MCL of 200 ug/L. The zinc concentration of 20,990 ug/L detected in sample GW-04 is 4 times the 5,000 ug/L Federal Secondary MCL for zinc [51]. The sources of arsenic, mercury, cyanide and zinc on the property could not be determined. However, given the site's long industrial history, these metals probably originated from on-site activities.

SURFACE WATER PATHWAY

The Bristol property is located in the Naugatuck Regional Basin within the Housatonic Major Basin [49]. The eastern property border is approximately 50 feet west of the Naugatuck River and 15 feet west of the river's 100 year floodplain [52]. Overland flow from impervious surfaces on the northern half of the property is directed into on-site catch basins which discharge into the Naugatuck River [2,53]. Overland flow from impervious portions of the southern half of the property is directed into a drainage swale which parallels the property's eastern border. The swale discharges into catch basins along Bristol Street [2]. The ultimate discharge point from the Bristol Street catch basins could not be determined.

The area of the most upstream probable point of entry (PPE) of overland flow from the property to the Naugatuck River is at a stormwater discharge outlet on the river east of the site. CT DEP file information indicated that stormwater drainage from the northern half of the site was at one time combined and discharged to the river with effluent from the on-site wastewater treatment plant. Stormwater drainage was rerouted to bypass the treatment system and discharge directly into the river at a later time [18]. The precise location of the most upstream PPE area could not be determined from available file information nor during WESTON field work due to rough terrain.

The 15-mile downstream surface water migration pathway from the PPE area is entirely contained within the Naugatuck River. The surface water pathway ends in Ansonia, CT, approximately 1.5 miles north of the confluence of the Housatonic River [1,54,55]. The CT DEP has classified the in-water segment of the Naugatuck River as "C/B". Surface water with this classification is not attaining certain water quality criteria or one or more designated uses due to point or non-point pollution sources. The State's goal is to upgrade water quality to achieve class "B" criteria and designated uses. Designated uses for class B surface water includes recreation, fish and wildlife habitat and agricultural and industrial supplies [45,46]. There are no known surface water intakes along the downstream surface water pathway [12,45,46].

The nearest gaging station on the Naugatuck river is located approximately 6.5 miles downstream from the site (Station # 01208500). The average river discharge recorded at this station over 67 years is 501 cubic feet per second (cfs) [56]. No known wetlands occur along the 15-mile downstream pathway [1,2,54,55]. The CT DEP Natural Diversity Database (NDDDB) did not provide information on sensitive species or habitats along the 15-mile downstream pathway [57]. Portions of the Naugatuck River along the 15-mile downstream pathway are capable of supporting cold water fisheries.

No previous surface water or sediment sampling data associated with the Bristol site were located in the State files. WESTON/ARCS did not collect surface water pathway samples during this Site Inspection. The Naugatuck River received treated wastewater from on-site metal plating operations under a NPDES permit between 1971 and 1988 [16,25]. Discharge monitoring for parameters specified by the CT DEP was required under the NPDES permit. Notices of discharge permit violations were received in 1985 and 1988 from the CT DEP for excess cadmium and amenable cyanide in the discharge [16,20]. Prior to 1971, the discharge is assumed to have been untreated.

SOIL EXPOSURE PATHWAY

The Bristol site has been vacant since September 1988. No employees are known to have been on the site on a regular basis since that time. There are no known residents on the property, although based on WESTON/ARCS observations, the site appears to be frequently vandalized. A 1983 CT DEP hazardous waste inspection report indicated that approximately 600 employees worked two shifts at that time [3].

The Bristol property is bordered to the west by a residential neighborhood. An estimated 40

people in this neighborhood reside approximately 200 feet from areas of potential subsurface contamination as identified through WESTON/ARCS source area soil samples (SS-05 through SS-08) on the western portion of the property. A six foot chain linked fence separates the residential area from the Bristol property [2]. An estimated 6,227 and 99,909 persons reside within one and four miles of the site, respectively [59]. A day care center, with approximately 10 children, is located in the residential area, approximately 200 feet west of areas of potential contamination on the Bristol property. However, WESTON/ARCS noted during field activities that these areas of potential contamination are predominantly paved [2]. There are no schools within 200 feet of areas of on-site contamination.

No terrestrial sensitive environments were observed on the property during WESTON/ARCS field activities. The majority of the Bristol property is occupied by the Bristol buildings or paved areas [2].

A 1986 environmental assessment of the Bristol property included the collection and analysis of 17 soil samples. TCE was detected in three locations. The highest concentration (18,000 ppb) was measured from an alleged illegal waste disposal area south of the employee parking lot. TCE was also detected on the west side of the Foster Enterprises building (30 ppb) and on the east side of the eastern courtyard (42 ppb) [8]. The TCE contamination area south of the employee parking lot was excavated, treated and disposed between 1988 and 1990 [22,23,26,27]. The other two area were attributed to historical on-site handling of the solvent but are not known to have been remediated.

WESTON/ARCS collected eight potential source soil samples and one reference soil sample from the Bristol property on December 18, 1993. Sample depths ranged from 1.5 to 2.5 feet. A variety of VOCs, SVOCs and metals were detected. The highest VOC concentration detected was 64,000 ug/kg acetone in the eastern courtyard area. In addition, the PCB Aroclor 1254 was detected at three locations, two of which are on the west side of the complex (940 ug/kg and 57 ug/kg) [38,39,40].

AIR PATHWAY

The nearest individuals to the Bristol site are the estimated 40 persons residing approximately 200 feet west of the site. There are no known on-site workers or residents [2]. An estimated 99,909 people reside within four miles of the property [59]. Table 9 summarizes estimated residential populations within four miles of the Bristol property. Worker population information within four miles of the site is not available.

Table 9

**Estimated Population Within Four Miles
of the Bristol Company**

| Radial Distance From Bristol Company (miles) | Estimated Population |
|--|----------------------|
| On-site | 0 |
| 0.00 < 0.25 | 399 |
| 0.25 < 0.50 | 1,198 |
| 0.50 < 1.00 | 4,630 |
| 1.00 < 2.00 | 18,717 |
| 2.00 < 3.00 | 31,215 |
| 3.00 < 4.00 | 43,750 |
| TOTAL | 99,909 |

[59]

Sensitive environments within four miles of the site include wetlands and one CT DEP NDDB point. Several wetland areas lie to the east and west of the site. Two approximately 12 acre wetland areas lie approximately 1.2 miles to the east and one 12 acre wetland lies approximately 2.2 miles to the east. To the west, an approximately 22 acre wetland area lies roughly 1.5 miles from the site and an approximately 50 acre wetland lies 2.1 miles from the site [1,54]. The one CT DEP NDDB point recorded is the variable sedge (*Carex polymorpha*), located between three and four miles from the Bristol property [57]. No known air sampling has been conducted on the Bristol property.

SUMMARY AND CONCLUSIONS

The Bristol Company (Bristol) is located at 40 Bristol Street in Waterbury, New Haven County, Connecticut. Bristol produced a line of instrumentation including temperature controls, chemical sensors, recorders and indicating devices from approximately 1897 until 1961. The Babcock Wilcox, Ltd. Company, Bristol Babcock Company and the American Chain and Cable Company manufactured similar products on-site between 1961 and September 1988. The property has been vacant since 1988.

The northern half of the approximately 17 acre subject property houses the former Bristol manufacturing complex, consisting of 15 interconnected buildings. The southern half of the property contains the former Bristol administration and maintenance garage buildings, the employee parking lot and an employee athletic field. The southern half of the property also includes a small manufacturing building leased to Foster Enterprises, an assembler of generator parts. The property is located in a residential and commercial zoned area of Waterbury. The

closest residential area lies approximately 200 feet west of areas of potential subsurface contamination on the western side of the property.

An estimated 9,615 and 3,679 persons are served by private and public groundwater supplies within four miles of the Bristol property. The nearest private well is located approximately one-third of a mile southwest of the site in Waterbury. The nearest public well is located approximately 2.2 miles southwest in Naugatuck, CT. A production well located on the southern end of the Bristol property was reportedly used for supplemental process water.

Overland flow from the northern half of the property is into catch basins which discharge to the Naugatuck River. Overland flow from the southern half of the property is directed into a drainage swale on the eastern border of the property and into catch basins on Bristol Street. The ultimate discharge point of the catch basins could not be determined. The 15-mile downstream surface water pathway from the site is contained within the Naugatuck River. No wetlands or other sensitive environments are known to exist along the 15-mile downstream pathway. There are no known drinking water intakes along the 15-mile downstream pathway.

An estimated 99,909 persons reside within four miles of the Bristol property. The nearest individuals to the property are the estimated 40 persons residing approximately 200 feet west of the site. A day-care center, with approximately 10 children, is located approximately 200 feet west of areas of potential subsurface contamination on the property.

Historical on-site manufacturing operations included the drilling, milling, stamping and grinding of steel, brass and aluminum barstock, vapor degreasing, nickel, cadmium and copper electroplating, epoxy and enamel painting, soldering and welding. A variety of chemicals including acids, metal plating solutions, cutting and lubricating oils, paints and organic compounds such as trichloroethene (TCE), 1,1,1-trichloroethane (TCA), methylene chloride, chloroform and toluene were used in production.

Electroplating wastewater was treated on-site and discharged to the Naugatuck River under a National Pollutant Discharge Elimination System (NPDES) permit since 1971. Untreated effluent was assumed to have been discharge to the river prior to 1971. Available State file information indicated that metal hydroxide sludge and waste solvents, paints and oils were stored on-site temporarily for off-site hauling and disposal. Waste handling in earlier years could not be determined from available file information and persons familiar with the site. The alleged use of an on-site waste lagoon could not be verified with available information.

An environmental assessment performed on the property in November 1986 indicated the presence of TCE in soil at the south end of the property, in the eastern courtyard of the manufacturing complex and on the west side of the Foster Enterprises operation. The TCE contaminated soil south of the parking lot was excavated, treated on-site and disposed of off-site, under Connecticut Department of Environmental Protection (CT DEP) supervision between 1987 and 1990.

The property was purchased by Norman Drubner in December 1986 who filed a Form III with the CT DEP. The Form III filing was based on the detection of TCE contamination on several portions of the property.

Closure activities which reportedly took place following the September 1988 ceasing of operations included the steam cleaning of the floors, ceilings and equipment in the plating area, the disposal of residual plating baths, the decontamination of an above ground TCE storage tank, the removal of several underground petroleum product storage tanks and a waste oil storage tank and the disposal of PCB contaminated waste oil from on-site screw machines.

In 1992, the CT DEP collected and analyzed two oil samples from on-site transformers in response to a citizen complaint of transformer vandalization. Based on analytical results confirming the presence of PCBs in the oil, the CT DEP issued a Notice of Violation to the property owner which required remediation of spilled transformer oil. The spills were reportedly remediated in October 1992.

WESTON/ARCS collected eight potential source soil samples and three groundwater samples from the Bristol property on December 18, 1992. Analytical results indicated the presence of several volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and metals in soil and groundwater, and the PCB Aroclor 1254 in soil and groundwater. Many of the elements and compounds detected in soil and groundwater had been used historically in on-site manufacturing.

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ATTACHMENT A
BRISTOL COMPANY
SOIL AND GROUNDWATER ANALYTICAL RESULTS
WESTON/ARCS

Samples Collected December 18, 1992



P.O. BOX 979
525 BROOK STREET
ROCKY HILL, CT 06067
203-257-3320 • FAX: 203-257-3689

October 1, 1993

Work Order No. 04100-009-060-0007

Drubner, Hartley & O'Connor
414 Meadow Street
Waterbury, CT 06702

Attn: Norman Drubner, Esquire

Subject: Final Site Inspection Report
Bristol Company
Waterbury, Connecticut
CERCLIS No. CTD981898406
TDD No. 9105-83-AWS
Work Assignment No. 09-1JZZ

Dear Mr. Drubner:

The Roy F. Weston, Inc. Alternative Remedial Contract Strategy (WESTON/ARCS) team was requested by the Region I U.S. Environmental Protection Agency (EPA) Waste Management Division to perform a Site Inspection of the Bristol Company property in Waterbury, Connecticut. WESTON/ARCS has completed this project and submitted a final report to the EPA. Enclosed is one copy of the Bristol Company property Final Site Inspection Report for your records.

If you have any questions regarding this report, please contact Ms. Jane Anderson, EPA Site Assessment Manager at (617) 573-9698.

Very truly yours,

ROY F. WESTON, INC.

Gregg W. Gabinelle
WESTON Region I ARCS
Task Manager

GWG/arc
Enclosures

cc: J. Anderson (EPA Site Assessment Manager)
J. Boesch (WESTON Site Manager)
S. Hayes (EPA Work Assignment Manager)
D. Zimmerman (CT DEP)



P.O. BOX 979
525 BROOK STREET
ROCKY HILL, CT 06067
203-257-3320 • FAX: 203-257-3689

September 17, 1993

Work Order No. 04100-009-060-0007

Ms. Sharon M. Hayes
Work Assignment Manager
U.S. EPA, Region I
Superfund Support Section (HSS-CAN-7)
John F. Kennedy Federal Building
Boston, MA 02203-2211

Subject: Final Site Inspection Report
Bristol Company
Waterbury, Connecticut
CERCLIS No. CTD981898406
TDD No. 9105-83-AWS
Work Assignment No. 09-1JZZ

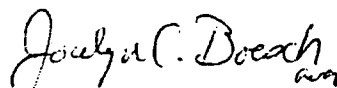
Dear Ms. Hayes:

Enclosed are two copies of the Final Site Inspection Report for the Bristol Company site in Waterbury, Connecticut. Comments received from the U.S. Environmental Protection Agency have been incorporated into this report. No comments were received from the Connecticut Department of Environmental Protection (CT DEP). Two copies of the final report have been sent to the CT DEP in Hartford under separate cover. Attachments have been omitted from this final deliverable as no comments or changes to the attachments were requested during the review process. The Final Site Inspection Report was prepared in response to Work Assignment No. 9-1JZZ.

Please call me if you have any questions regarding this report.

Very truly yours,

ROY F. WESTON, INC.


Jocelyn C. Boesch
WESTON Region I ARCS
Site Manager

JCB:arc

Enclosures

cc: J. Anderson (EPA Site Assessment Manager)
G.W. Gabinelle (WESTON Task Manager)



P.O. BOX 979
525 BROOK STREET
ROCKY HILL, CT 06067
203-257-3320 • FAX: 203-257-3689

September 17, 1993
Work Order No. 04100-009-060-0007

Mr. Doug Zimmerman
Superfund Site Assessment Contact
State of Connecticut
Department of Environmental Protection
165 Capitol Avenue
Hartford, CT 06106

Subject: Final Site Inspection Report
Bristol Company
Waterbury, Connecticut
CERCLIS No. CTD981898406
TDD No. 9105-83-AWS
Work Assignment No. 09-1JZZ

Dear Mr. Zimmerman:

Enclosed are two copies of the Final Site Inspection Report for the Bristol Company, site in Waterbury, Connecticut. The U.S. Environmental Protection Agency comments regarding the contents of the Draft Site Inspection Report have been incorporated. No comments were received from the Connecticut Department of Environmental Protection. Attachments have been omitted from this final deliverable as no comments or changes to the attachments were requested during the review process. The Final Site Inspection Report was prepared in response to Work Assignment No. 9-1JZZ.

Please call me if you have any questions regarding this report.

Very truly yours,

ROY F. WESTON, INC.

Jocelyn C. Boesch
WESTON Region I ARCS
Site Manager

JCB:arc
Enclosures

cc: S. Hayes (EPA Work Assignment Manager)
G.W. Gabinelle (WESTON Task Manager)